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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. SWR-0056

In Re Application Of:

Klaus-Leo Wilbuer, et al.

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/856,816	08/06/2001	Jack W. Keith	23413	3641	4738

Invention: **METHOD FOR PRODUCING A COATING OF NEUTRONS PRODUCED IN NUCLEAR REACTIONS OF RADIOACTIVE MATERIALS**

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **September 7, 2004**

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Dated: **November 5, 2004**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPELLANT:	KLAUS-LEO WILBUER, ET AL.	) Before the Board of Appeals
SERIAL NUMBER:	09/856,816	)
FILED:	August 6, 2001	)
FOR:	METHOD FOR PRODUCING A COATING OF NEUTRONS PRODUCED IN NUCLEAR REACTIONS OF RADIOACTIVE MATERIALS	) Art Unit 3641

APPEAL BRIEF

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1. THE REAL PARTY IN INTEREST

The real parties in interest in this Appeal are Metallveredlung GmbH & Co. KG and GNB Gesellschaft für Nuklear-Behälter mbH. Ownership by Metallveredlung GmbH & Co. KG and GNB Gesellschaft für Nuklear-Behälter mbH is established by assignment document recorded for this application on August 6, 2001, at Reel 012051, Frame 0985.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interference proceedings known to Appellants, Appellants' legal representatives, or assignees that will directly affect or be directly affected by or have a bearing on the decision of the Board of Patent Appeals and Interferences in the pending appeal.

3. STATUS OF CLAIMS

Claims 38-58 are pending. Claims 44 and 48-58 are withdrawn from consideration. Claims 38-43 and 46 stand rejected under 35 U.S.C. § 102(b) as being unpatentable over Wang (United States Patent No. 4,238,299) (hereinafter "Wang"). Claims 38-43 and 46 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Wang in view of U.S. Patent No. 5,372,701 to Gerdon ("Gerdon"), U.S. Patent No. 4,865,645 to Planchamp ("Planchamp"), and applicants admitted prior art on Page 7 of the application. Claims 45 and 47 stand rejected under 35 U.S.C. § 103(a) as allegedly obvious over Wang in view of U.S. Patent No. 3,411,999 to Weinberg ("Weinberg").

4. STATUS OF AMENDMENTS

There have been no amendments filed subsequent to receipt of the Final Office Action dated July, 7, 2004.

5. SUMMARY OF INVENTION

The present invention is directed to a method of producing a coating for absorbing neutrons. At least part of a shielding element consisting of a base material is provided with a coating by contacting it with a dispersion bath. (Specification, page 5, lines 16-20) During the coating process, there is a relative movement between the surface to be coated and the dispersion bath. (Specification, page 5, line 22- page 6, line 1) The dispersion bath comprises an element with high neutron capture capability such as an element of the group containing boron which can contain an electrical conductor such as iron boride or nickel boride. The dispersion bath also contains a metallic element suitable for electrolytic or autocatalytic deposition such as nickel, cadium, or copper. (Specification page 6, lines 9-10 and 18-19)

A key feature of the invention is the relative movement between the surface to be coated and the dispersion bath during the coating process. The relative movement, at least in part, maintains the particles dispersed in the dispersion bath. This is a distinct advantage over conventional mixing methods involving recirculators and/or pumps which may wear out in a relatively short period of time. Another key feature is the use of electrically conductive elements of compounds with a high neutron capture capability which augments the embedment rates and allows for the use of thinner layers.

Advantages of the invention include independence of the type of base material employed, and manufacture of either a finished product or individual components.

With respect to the coating, the high neutron capture cross-section component can be present at up to 60 % by volume, or up to 40% by volume. (Specification, page 9, lines 15-16) The layer may be 300 μm, 500 μm, up to 800 μm, or even up to 2000 μm thick. (Specification, page 9, lines 16-18)

In a test of the method, steel plates were coated in a nickel/boron carbide dispersion bath. The steel plates were turned every half hour and intermittently moved up and down to produce relative movement between the surface to be coated and the

dispersion bath. It was possible by this method to embed boron carbide in a nickel matrix at a concentration of 40% by volume. (Specification, page 10, lines 1-6)

6. ISSUES

There are three issues on appeal: (1) whether claims 38-43 and 46 are patentable under 35 U.S.C. §102(b) over Wang, (2) whether claims 38-43 and 46 are patentable under 35 U.S.C. § 103(a) over Wang in view of Gerdon, Planchamp, and Appellants admitted prior art on page 7 of the Specification, and (3) whether claims 45 and 47 are patentable under 35 U.S.C. § 103(a) over Wang in view of Weinberg.

7. GROUPING OF CLAIMS

The claims stand together.

8. ARGUMENT

A. Rejection of Claims 38-43 and 46 under 35 U.S.C. § 102(b). Claims 38-43 and 46 are patentable over Wang.

The present claims are directed to a method for producing a coating for absorption of neutrons generated in nuclear reaction of radioactive materials on a shielding element at least partly, the method comprising: providing a shielding element having a base material and appropriately predefined surfaces; providing a dispersion bath comprising a first substance having a high neutron capture cross-section and a second substance being electrolytically precipitable metallic wherein the first substance is in a form of an electrically conductive compound; submerging said shielding element at least partly with appropriately predefined surfaces to be coated into said dispersion bath; intermittently generating a relative movement between the respective surface to be coated and the dispersion bath during the coating process; and removing the shielding element from said dispersion bath.

Wang discloses a method for producing shielding elements containing boron carbide particles embedded in a copper matrix. Wang teaches that a tube of stainless steel is removably situated on the bottom of an electrolytic cell so as to be disposed in

electrical contact with a cathode contact connected to a current source. (Column 3, lines 6-12) The cell is filled with "conventional copper electrolyte solution 24 containing copper ions" such that "[t]he entire cell 10 is filled to a level about anode 12...." (Column 3, lines 16-18) Anode 12 is connected to the current source. "[B]oron carbide particles 26 are introduced through funnel 14 *while agitating the electrolyte solution with the stirrers 16.*" (Column 3, lines 20-22, emphasis added) A thin layer of copper is plated on the exposed upper surface of the tube (before or during the introduction of the boron carbide particles) to improve the bonding between the stainless steel and the layer to be built up on the tube surface. (Column 3, lines 24-27) "*[T]he stirrers 16 are [then] stopped to allow the [boron carbide] particles to settle onto the surface of the tube 18 while electroplating proceeds...,*" thereby trapping the boron carbide particles in the copper plate. (Column 3, lines 29-31, emphasis added) As such, Wang teaches a method of electroplating boron carbide particles onto the tube by stopping agitation to allow the boron carbide particles to settle onto the tube. Thus, there is no dispersion of the boron carbide during the coating process. Because there is no dispersion of particles, there can be no movement relative to a dispersion bath during the coating process. Further, in this embodiment, there is no movement of the surface to be coated during the coating process.

In another embodiment of Wang, a rotation of the tubes to be coated to expose the next face "after plating" is disclosed. (Column 4, lines 19-22) This process differs from the claimed process because the tube rotation does not occur during the coating process. As with the embodiment described above, there is also no dispersion of the boron carbide during the coating process.

In yet another embodiment of Wang, square tubes are arranged around the circumference of a rotatable drum filled with an electrolyte containing copper ions. (Column 4, lines 32-45) Boron carbide particles are introduced into the electrolyte and evenly distributed over the surfaces of the tubes by "first slowly rotating the assembly and then increasing the rotational speed gradually until the boron carbide particles settle evenly on the inside surface of the drum". (Column 4, lines 45-52) In another arrangement, the tube is mounted coaxially in the rotatable drum. (Column 5, lines 4-9) In both of these arrangements, there appears to be relative movement between the rotatable drum and the surface to be coated, but not between the bath itself and the

surface to be coated. As with the previous embodiment, the surface to be coated is rotated in between coatings to expose a fresh surface to be coated. This rotation, however, does not occur during the coating process. In addition, there is no dispersion in these arrangements because the boron carbide particles are introduced and "settle evenly on the inside surface of the drum". (Column 4, lines 50-51)

In particular, the Examiner alleges that "Wang discloses applicant's inventive concept". (Paper 17, page 3) The Examiner also alleges that Wang discloses "Providing a dispersion bath having a first substance (26) boron carbide having a high neutron capture cross section and a second substance (24) (copper) being an electrolytically metal". (Paper 17, page 3) Regarding the materials used, the Examiner alleges "While Wang does identify the boron carbide as being electrically non-conductive when combined with the copper ions the boron carbide in question is electrically conductive". (Paper 17, page 3) The Examiner additionally notes that "the boron carbide is added slowly over a period of time while mixing the bath, stopping the stirring allowing the boron carbide particles to settle and then introducing more boron carbide and repeating the process". (Paper 17, Page 3)

Appellants' invention differs from the disclosure of Wang in several aspects. First, Appellants' claim "generating relative movement between the respective surface to be coated and the dispersion bath *during the coating process*". As admitted by the Examiner, the sections of Wang cited by the Examiner disclose stopping mixing to allow the particles to settle, i.e., stopping mixing during coating. Thus, there is no relative motion during coating in the cited sections of Wang. Second, Wang does not teach the use of a dispersion bath during the coating process because mixing is stopped and the particles settle during coating. Third, the first substance of the present claims is an electrically conductive compound. Wang specifically states that the boron carbide particles are "unprecoated electrically nonconductive boron carbide particles". There is no teaching in Wang to suggest that the boron carbide becomes conductive as suggested by the Examiner.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). Moreover,

the single source must disclose all of the claimed elements "arranged as in the claim." *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984).

As stated above, there are three elements missing from Wang: relative movement during coating, a dispersion bath during coating, and a first substance in the form of an electrically conductive compound. The first missing element is relative movement. The cited sections of Wang do not teach relative movement between the suspended bath and the substrate to be coated during the coating process. In fact, mixing is stopped so that the particles may settle by gravity. This is not what is presently claimed. In the present case, relative motion is used during the coating process to keep the particles dispersed in a dispersion bath during the coating process. In the process of Wang, in fact, if mixing were resumed during the coating process, the particles settled by gravity on the surface would be swept away. Thus, mixing during coating is contrary to this teaching of Wang.

In the Final Office Action, the Examiner appears to argue that the Appellants, in their previous response, rely on a particular sequence of events. The Examiner states "As broadly interpreted Wang sets forth a process wherein the dispersion coating is intermittently stirred during the coating process". (6282004 paper, page 2) The Examiner highlights this point by stating that Wang reads on the Appellants' claims because Appellants' "claim language 'during the coating process' does not mean coating takes place only during the relative movement of the dispersion material". (6282004 paper, page 2) Appellants disagree with the Examiner's allegations

First, Appellants' disagree that Wang discloses a process with intermittent stirring during the coating process. Wang discloses a process in which coating of boron nitride occurs by gravity. As one of ordinary skill in the art would understand, there is no stirring during the coating process, otherwise the particles would not settle due to gravity. In addition, while there is movement of the substrate to be coated in Wang, this movement does not occur during the coating process. Wang is thus missing the Appellants' claim element of "intermittently generating a relative movement between the respective surface to be coated and the dispersion bath during the coating process".

Second, the Appellants' claims at least require relative movement "during the coating process". This claim language does not preclude relative movement during other

than during coating as recognized by the Examiner. Wang, however, does not read on the Appellants' claims because Wang does not teach a relative movement "during the coating process". The relative movement disclosed in Wang is not "during the coating process", but in between successive coating of different surfaces.

In the Final Office Action, the Examiner further argues that "Movement takes place by the dispersion material contacting the surface of the material to be exposed". (6282004 paper, page 3) The Examiner alleges that "relative movement takes place at the material surface". (6282004 paper, page 3) Appellants submit that the movement described by the Examiner is local movement and not relative movement. One of ordinary skill in the art would understand that relative movement as claimed by the Appellants is a macroscopic phenomenon which may be accomplished by moving the substrate to be coated, mechanically moving the bath, by blowing in gas, by ultrasonic means, etc. The movement described by the Examiner, in contrast, is a local surface phenomenon in which individual particles move at the surface of the substrate. The local movement at the surface described by the Examiner is not a relative movement as presently claimed and as it would be understood by one of skill in the art. Wang thus does not teach a relative movement.

The second missing element is a dispersion bath during coating. In the present application, the first substance (i.e., boron carbide particles) is kept dispersed with the matrix building material (i.e., nickel) during the coating process. In Wang, while the boron carbide particles appear to be dispersed in the electrolyte prior to coating, mixing is stopped during the coating process. Wang teaches the deposition of boron carbide resulting from the physical "settling out" of the boron carbide particles from the liquid phase of the electrolyte solution once agitation has ceased. In the embodiments of Wang where the tubes are rotated during coating, the boron carbide particles are not dispersed in the solution, but rather "settle[d] evenly on the inside surface of the drum" and then rotating the drum while electroplating copper (Column 4, lines 45-62), or alternatively the particles "fall evenly onto the outside surfaces of the square tubing continuously". (Column 5, lines 16-19) In none of these cases is a dispersion bath employed during the coating process. Thus, this element of the present claims that is not taught by Wang.

The third missing element is the first substance in the form of an electrically

conductive compound. This element is present in the dispersion bath in the present claims. There is no teaching in Wang to suggest that the boron carbide particles are coated with the copper in the solution as alleged by the Examiner. In Wang it is stated that "the carbide particles 26 are being dispersed in the electrolyte" and "as the copper level rises, particles 26 become entrapped in the growing composite layer 30". (Column 3, lines 22-33) Thus, in Wang, there is no teaching that the boron carbide particles become coated with copper in the bath, i.e., before the coating is actually formed. This interpretation is consistent with the nonconductive boron carbide particles settling on the surface to be coated by gravity while the copper is electroplated. Thus, Wang appears to teach only a nonconductive first substance, not conductive as presently claimed.

In the Final Office Action, the Examiner reiterates the argument that the boron carbide in the bath of Wang is conductive because it is in the bath with copper, which is conductive. As support, the Examiner cites figures 1 and 2a-2d which show that "via gravity the shielding surface (18) is coated with the copper/boron carbide". (6282004 paper, page 3) These figures illustrate the coating that is formed, and not the bath that is used to form the coatings. Appellants agree with the Examiner that the coating contains copper/boron carbide. This, however, does not elucidate the state of the boron carbide in the bath, only in the coating. In the bath, the boron carbide is deposited by gravity and the copper is electroplated. The electroplated copper traps the boron carbide to form the coating. (Column 3, ll. 16-40) If the boron carbide were conductive, as alleged by the Examiner, it would not be deposited by gravity and would not need to be trapped by the electroplated copper. Appellants submit that there is nothing in the disclosure of Wang to suggest that the boron carbide is conductive, and in fact the disclosure of Wang is consistent with nonconductive boron carbide.

The Examiner further states that "Why is boron carbide considered to be electrically conductive here, but not in Wang?" (6282004 paper, page 3) Appellants note that the claims are directed to a first substance "wherein the first substance is in a form of an electrically conductive compound", not boron carbide. Appellants do not allege that boron carbide by itself is electrically conductive. As described in the present specification, metal compounds such as iron boride and nickel boride are good electrical conductors.

Because Wang is missing at least three present claim elements, Wang does not anticipate the present claims. Wang also does not render the present claims obvious. Wang provides not motivation or expectation of success to use relative movement between the surface to be coated and a dispersion bath during coating. Because the coating of Wang is formed in the absence of mixing, and mixing would likely disrupt the coating being formed, Wang appears to teach away from relative movement during coating. Likewise, while Wang teaches a dispersion prior to coating, mixing is stopped so that the boron carbide particles can settle out of the solution during coating. There is thus no dispersion bath during the coating process of Wang. Because the particles settle by gravity, there is no motivation or expectation of success to maintain a dispersion during coating. Finally, Wang teaches a nonconductive boron carbide which can be deposited by gravity while copper is coated electrochemically. There is no motivation or expectation of success for the use of an electrically conductive high neutron capture cross-section material as presently claimed.

For at least the foregoing reasons, all of the limitations of Claims are not taught in Wang. Thus, the Examiner's rejection of Claim 38 under 35 U.S.C. §102(b) as being obvious over Wang is improper. Appellants respectfully request the reversal of the 35 U.S.C. §102(b) rejection of Claim 38 on these grounds. In addition, because claims 39-43 and 46 include all of the limitations of claim 38, these claims are also not anticipated by Wang. Appellants also request reversal of the rejection of claims 39-43 and 46 on these grounds.

B. Rejection of Claims 38-43 and 46 under 35 U.S.C. §103(a): Claims 38-43 and 46 are patentable over Wang in view of Gerdon, Planchamp, and Appellants' admitted prior art on page 7 of the Specification.

Gerdon is directed to a process and apparatus for electroplating. (Abstract) Gerdon teaches the use of nickel, copper, and cadmium as metals for use in electroplating. (Column 1, lines 42-45)

Planchamp is directed to a nuclear magnetic radiation absorber. Planchamp teaches the use of elements such as gadolinium, samarium, europium, hafnium, cadmium,

lithium, and dysprosium.

In the Specification on Page 7, Appellants discuss boron materials having augmented neutron capture cross-sections.

In making the rejection, the Examiner states "It would have been obvious to one having ordinary skill in the art at the time the invention was made to have substituted known electroplating materials and high neutron capture cross-section materials, based on the conventional knowledge in the art". (Paper 17, page 5)

As described in detail above, Wang is missing at least three elements of the present claims, i.e., relative movement during coating, a dispersion bath during coating, and a first substance in the form of an electrically conductive compound. Gerdon, Planchamp, and Appellants' admitted prior art do not cure these defects.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d 1016, 1023 (Fed. Cir. 1996).

None of the cited references alone or in combination disclose relative movement during coating, or a dispersion bath during coating. Thus, there are claim elements that are missing from the cited references. Regarding the disclosure of additional materials in Gerdon, Planchamp, and Appellants' admitted prior art, there is no motivation or expectation of success to use these materials in the method of Wang. Wang specifically discloses the use of an electrically nonconductive boron carbide which settles by gravity in the coating while copper is electroplated. There is not motivation or expectation of success for the use of a conductive material in place of the electrically nonconductive material.

For at least the foregoing reasons, all of the limitations of independent Claim 38 and is not taught or suggested by Wang, Gerdon, Planchamp, and Appellants admitted prior art on page 7 of the Specification, either individually or in combination. Thus, the Examiner's rejection of Claim 38 under 35 U. S.C. §103(a) as being obvious over Wang in view of Gerdon, Planchamp, and Appellants' admitted prior art on page 7 of the Specification, is improper. Because Claims 39-43 and 46 depend from Claim 38, and because claims that depend from a claim that is non-obvious are themselves necessarily non-obvious, Appellants submit that Claims 39-43 and 46 are also non-obvious. Therefore, Appellants respectfully assert that the Examiner's rejection of Claims 39-43 and 46 is also improper. Appellants respectfully request the reversal of the 35 U.S.C. §103(a) rejection of Claims 38-43 and 46 on these grounds.

C. Rejection of Claims 45 and 47 under 35 U.S.C. §103(a): Claims 45 and 47 are patentable over Wang in view of Weinberg.

Weinberg teaches a method of etching a refractory metal on a surface. It is taught that the electrolyte may be in a glass tank. Ultrasonic vibrations may be used to allow the electrolyte to uniformly attack the surface. (Column 2, lines 26-48)

In making the rejection, the Examiner states "Modification of Wang to have included the vessel construction and mixing teachings of Weinberg would have been obvious to one having ordinary skill in the art at the time the invention was made as such results are in no more than the use of conventionally known equivalents within electroplating art as is evident by the teachings of Weinberg". (Paper 17, page 6)

As described in detail above, Wang is missing at least three elements of the present claims, i.e., relative movement during coating, a dispersion bath during coating, and a first substance in the form of an electrically conductive compound. Weinberg does not cure these defects, thus the disclosure of reaction vessels and mixing methods is not relevant. Wang and Weinberg, alone or in combination, do not render the present claims obvious.

For at least the foregoing reasons, all of the limitations of Claims 45 and 47 are not taught or suggested by Wang and Weinberg, either individually or in combination. Thus, the Examiner's rejection of Claims 45 and 47 under 35 U. S.C. §103(a) as being obvious over Wang in view of Weinberg is improper. Appellants respectfully request the reversal of the 35 U.S.C. §103(a) rejection of Claims 45 and 47 on these grounds.

D. Conclusion

For the reasons discussed above, Appellants respectfully submit that this application is in condition for allowance and requests reversal of the outstanding rejections and early allowance of this application. If there are any additional charges with respect to this Appeal Brief or otherwise, they may be charged to Deposit Account No. 06-1130.

Respectfully submitted,

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APPENDIX

IN THE CLAIMS

1-37. (canceled)

38. A method for producing a coating for absorption of neutrons generated in nuclear reaction of radioactive materials on a shielding element at least partly, the method comprising:

providing a shielding element having a base material and appropriately predefined surfaces;

providing a dispersion bath comprising a first substance having a high neutron capture cross-section and a second substance being electrolytically precipitable metallic wherein the first substance is in a form of an electrically conductive compound;

submerging said shielding element at least partly with appropriately predefined surfaces to be coated into said dispersion bath;

intermittently generating a relative movement between the respective surface to be coated and the dispersion bath during the coating process; and

removing the shielding element from said dispersion bath.

39. The method as set forth in claim 38, wherein the second substance is one element of the group that consists of nickel, cadmium and copper.

40. The method as set forth in claim 38, wherein the first substance is at least one of the elements of the group that consists of boron, gadolinium, cadmium, samarium, europium and dysprosium.

41. The method as set forth in claim 40, wherein the first substance is an isotope having an augmented neutron capture cross-section.

42. The method as set forth in claim 38, wherein the electrically conductive compound of the first substance is a metallic compound.

43. The method as set forth in claim 42, wherein the electrically conductive compound of the first substance is metal boride.

44. (withdrawn)

45. The method as set forth in claim 38, wherein the relative movement is generated by blowing in a gas and/or by introducing ultrasound waves.

46. The method as set forth in claim 38, wherein the dispersion bath is thoroughly mixed at least periodically during the coating process.

47. The method as set forth in claim 38, wherein the process is performed in a ceramic or glass vessel.

48-58. (withdrawn)